

HiGee strategy towards large-scale synthesis of soluble covalent organic frameworks

Yun Zhao¹, Xiaogang Yu¹, Xin Wen¹, Yong Luo¹, Zhonghua Xiang¹, and Jianfeng Chen¹

¹Beijing University of Chemical Technology

February 8, 2022

Abstract

The scale-up synthesis of covalent organic frameworks (COFs) with uniform structure and properties is of great importance for their practical applications. Here, we proposed a facile way to massively produce phthalocyanine-like COFs (COFBTC) via high-gravity intensified synthesis. Alcoholic solvent and basic catalyst were discovered synergically improved the formation of COFBTC. High concentration and reaction temperature were beneficial for high production as well. The intensified mass and heat transfer at high gravity (HiGee) environment promoted the scaling-up of COFBTC with homogeneous structures and properties. A high space time yield of 305.9 kg^[?](m³^[?]D)-1 was achieved for Fe-COFBTC under optimized condition. The massively produced Fe-COFBTC presented good solubility in alkaline and polar organic solvents, thus allow to process as homogeneous or heterogenous electrocatalyst for oxygen reduction reaction. The catalyst exhibited good performance of 0.79 V (vs. RHE, half-wave) and >95% recovery in homogeneous electroreduction of O₂ in 0.1 M KOH.

Hosted file

HiGee strategy towards large-scale synthesis of soluble covalent organic frameworks-plaintext.docx available at <https://authorea.com/users/459573/articles/555803-higee-strategy-towards-large-scale-synthesis-of-soluble-covalent-organic-frameworks>